low capacity channels **8855** through which the intended destination for the respective data units can be reached.

The SONET network can perform at least one of SONET switching, SONET multiplexing, and SONET de-multiplexing. In a possible embodiment, SONET switching is implemented by using at least one of time driven switching (TDS) technology and time driven priority technology, as described above in this disclosure.

From the foregoing, it will be observed that numerous variations and modifications may be effected without departing from the spirit and scope of the invention. It is to be understood that no limitation with respect to the specific apparatus illustrated herein is intended or should be inferred. It is, of course, intended to cover by the appended claims all such modifications that fall within the scope of the claims.

WHAT IS CLAIMED IS:

1. A grooming system, comprising a plurality of input channels, and at least one output channel, the system comprising:

a Common Time Reference (CTR), divided into a plurality of contiguous time frames (TFs), wherein the time frames have a plurality of predefined time durations; and

means for mapping into each of the time frames for each of the output channels, from a respective subset of the time frames for respective ones of the input channels.

2. The system as in claim 1, wherein each of the input channels has a plurality of channel bit rates.

3. The system as in claim 1, wherein the time frames for each of the output channels and input channels are grouped according to a respective common cycle;

wherein each of the common cycles is associated with respective ones of the channels.

4. The system as in claim 3, wherein the common cycles have a common duration.

5. The system as in claim 3, wherein the common cycles for each of the channels are time offset relative to the respective common cycles for the other ones of the channels.

6. The system as in claim 3, wherein the common cycles for each of the channels are aligned relative to the CTR.

7. The system as in claim 3, wherein the common cycles for each of the channels are time offset relative to the CTR.

8. The system as in claim 3, wherein the mapping reoccurs periodically for each of the common cycles.

9. The system as in claim 1, wherein each of the time frames for the output channel is comprised of at least one sub-time frame;

wherein each of the input channel time frames is mapped into a respective one of the output channel sub-time frames.

10. The system as in claim 1, wherein each of the time frames for the input channels and the output channels is comprised of at least one sub-time frame;

wherein each of the input channel sub-time frames is mapped into a respective one of the output channel sub-time frames.

11. The system as in claim 1, wherein each of the time frames provides a plurality of data units;

wherein the mapping of the time frames for respective ones of the input channels is provided for each of the data units from a respective subset of the input channels to the respective output channel.

12. The system as in claim 11, wherein the data units from each of the plurality of the input channels for the respective subset are combined in a predefined order with the data units from other ones of the plurality of the input channels for the respective subset.

13. The system as in claim 11, wherein the data units are at least one of a byte, a word, a packet, and an ATM cell.

14. The system as in claim 10, wherein delimiters are provided between sub-time frames.

15. The system as in claim 11, wherein delimiters are provided between data units.

16. The system as in claim 1, wherein delimiters are provided between time frames.

17. The system as in claim 1, wherein a time stamp is associated with selected ones of the time frames,

wherein the time stamps are derived responsive to the CTR.

18. The system as in claim 1, wherein each one of the input channels and the output channels is at least one of an optical channel, a wavelength division multiplexing channel, a fiber channel, a SONET optical channel: OC-1 to OC-192.

19. The system as in claim 1, wherein the means for mapping combines at least one of the following: two time frames of selected ones of the input channels into one time frame of a selected one of the output channels, four time frames of selected ones of the input channels into one time frame of a selected one of the output channels, eight time frames of selected ones of the input channels into one time frame of a selected one of the output channels, and sixteen time frames of selected ones of the input channels into one time frame of a selected one of the output channels.

20. The system as in claim 1, wherein the means for mapping combines at least one of the following: selected parts of two time frames of selected ones of the input channels into one time frame of a selected one of the output channels, selected parts of four time frames of selected ones of the input channels into one time frame of a selected one of the output channels, selected parts of eight time frames of selected ones of the input channels into one time frame of a selected one of the output channels, and selected parts of sixteen time frames of selected ones of the input channels into one time frame of a selected one of the output channels.

21. A grooming system, comprising:

a plurality of grooming subsystems each comprising at least one output channel and a plurality of input channels each with a plurality of channel bit rates,

a Common Time Reference (CTR), divided into a plurality of contiguous time frames (TFs), wherein the time frames have a plurality of predefined time durations; and

means for mapping from a respective subset of the time frames for the respective ones of the input channels to a respective output channel for each of the time frames for each of the output channels.

22. The system as in claim 21, wherein the time frames for each of the output channels and the input channels are grouped according to a respective common cycle;

wherein all the common cycles are associated with respective ones of the input channels and the output channels, wherein the common cycles have a common duration.

23. The system as in claim 22, wherein the common cycles for each of the channels are time offset relative to the respective common cycles for the other ones of the channels.

24. The system as in claim 21, wherein the output channels from a first plurality of the grooming subsystems are coupled to the input channels of a first separate one of the grooming subsystems, to provide a first grooming output.

25. The system as in claim 24, wherein the output channels from a second plurality of the grooming subsystems are coupled to the input channels of a second separate one of the grooming subsystems, to provide a second grooming output;

wherein the system is further comprised of a third grooming subsystem, wherein the first and second grooming outputs are coupled to the input channels of the third grooming subsystem.

26. The system as in claim 21, wherein each one of the input channels and the output channels is at least one of an optical channel, a wavelength division multiplexing channel, a fiber channel, a SONET optical channel: OC-1 to OC-192.

27. A grooming system, comprising:

a plurality of input channels, and at least one output channel;

a Common Time Reference (CTR), divided into a plurality of contiguous time frames (TFs), wherein the time frames have a plurality of predefined time durations; and

wherein each of the time frames consists of a predefined number of plurality of data units;

means for mapping for each of the time frames of each of the output channels a predefined subset of the data units from a respective subset of the time frames for a respective subset of the input channels.

28. The system as in claim 27,

wherein the data units are at least one of a byte, a word, a packet, an ATM cell.

29. The system as in claim 27,

wherein the mapping of the data units for the time frames of the input channels into the respective time frame of the respective output channel is done in a predefined order.

30. The system as in claim 21, wherein the means for mapping maps between at least one of the following: selected ones of four OC-3 input channels to a selected one of OC-12 output channels, selected ones of sixteen OC-3 input channels to a selected one of OC-48 output

channels, selected ones of four OC-12 input channels to a selected one of OC-48 output channels, selected ones of sixteen OC-12 input channels to a selected one of OC-192 output channels, and selected ones of four OC-48 input channels to a selected one of OC-192 output channels.

31. A degrooming system, comprising:

a plurality of output channels, and at least one input channel;

a Common Time Reference (CTR), divided into a plurality of contiguous time frames (TFs), wherein the time frames have a plurality of predefined time durations; and

means for mapping for each respective one of the time frames from the respective input channel to at least one time frame of at least one of the output channels.

32. The system as in claim 31, wherein the time frames for each of the output channels and input channels are grouped according to a respective common cycle;

wherein each of the common cycles is associated with respective ones of the channels, wherein the common cycles have a common duration.

33. The system as in claim 32, wherein the common cycles for each of the channels are time offset relative to the respective common cycles for the other ones of the channels.

34. The system as in claim 32, wherein the mapping reoccurs periodically for each of the common cycles.

35. The system as in claim 31, wherein each of the time frames for the input channel is comprised of at least one sub-time frame;

wherein each of the input channel sub-time frames is mapped into at least one of the output channel time frames.

36. The system as in claim 31, wherein each of the time frames for the output channels and the input channels is comprised of at least one sub-time frame;

wherein each of the input channel sub-time frames is mapped into one of the output channel sub-time frames.

37. The system as in claim 31, wherein each of the time frames provides a plurality of data units;

wherein the mapping of the time frames for the respective ones of the output channels is provided from a respective subset of the input channels; and

wherein each of the time frames of the output channels receives a subset of data units from the input channel.

38. The system as in claim 37, wherein the data units are at least one of a byte, a word, a packet, an ATM cell.

39. The system as in claim 37, wherein delimiters are provided between data units.

40. The system as in claim 31, wherein delimiters are provided between time frames.

41. The system as in claim 31, wherein a time stamp is associated with selected ones of the time frames,

wherein the time stamp is derived responsive to the CTR.

42. The system as in claim 31, wherein each of the input channels and output channels is at least one of an optical channel, a wavelength division multiplexing channel, a fiber channel, a SONET optical channel: OC-1 to OC-192.

43. A grooming method, for use with a switching system comprising a plurality of input channels, and at least one output channel, the method comprising:

providing a Common Time Reference (CTR);

dividing the CTR into a plurality of contiguous time frames (TFs), wherein the time frames have a plurality of predefined time durations; and

mapping into each of the time frames for each of the output channels, from a respective subset of the time frames for respective ones of the input channels.

44. The method as in claim 43, further comprising:

grouping the time frames for each of the output channels and the input channels associated according to a respective common cycle; and

associating each of the common cycles with respective ones of the channels.

45. The method as in claim 44, wherein the common cycles have a common duration.

46. The method as in claim 44, wherein the common cycles for each of the channels are time offset relative to the respective common cycles for the other ones of the channels.

47. The method as in claim 44, wherein the common cycles for each of the channels are aligned relative to the CTR.

48. The method as in claim 44, wherein the common cycles for each of the channels are time offset relative to the CTR.

49. The method as in claim 44, further comprising:

providing the mapping for each of the common cycles on a periodically reoccurring basis.

50. The method as in claim 43, wherein each of the time frames for the output channel is comprised of at least one sub-time frame, the method further comprising:

mapping each of the input channel time frames into a respective one of the output channel sub-time frames.

51. The method as in claim 43, wherein each of the time frames for the input channels and the output channels is comprised of at least one sub-time frame, the method further comprising:

mapping each of the input channel sub-time frames into a respective one of the output channel sub-time frames.

52. The method as in claim 43, wherein a plurality of data units can be transferred within each of the time frames, the method further comprising:

mapping the time frames for respective ones of the input channels provided for each of the data units from a respective subset of the input channels to the respective output channel.

53. The method as in claim 52, further comprising:

combining the data units from each of the plurality of the input channels for the respective subset in a predefined order with the data units from other ones of the plurality of the input channels for the respective subset.

54. A grooming method for use with a switching system, comprising a plurality of input channels, and at least one output channel, the method comprising:

providing a Common Time Reference (CTR);

dividing the CTR into a plurality of contiguous time frames (TFs), wherein the time frames have a plurality of predefined time durations, wherein each of the time frames consists of a predefined number of plurality of data units; and

mapping for each of the time frames of each of the output channels a predefined subset of the data units from a respective subset of the time frames for a respective subset of the input channels.

55. The method as in claim 54,

wherein the data units are at least one of a byte, a word, a packet, an ATM cell.

56. A degrooming method, for use with a switching system comprised of a plurality of output channels, and at least one input channel comprised of the method comprising:

providing a Common Time Reference (CTR),

dividing the CTR into a plurality of contiguous time frames (TFs), wherein the time frames have a plurality of predefined time durations; and

mapping for each respective one of the time frames from the respective input channel to at least one time frame of at least one of the output channels.

57. The method as in claim 56, further comprising:

grouping the time frames for each of the output channels and the input channels according to a respective common cycle;

associating each of the common cycles with respective ones of the channels, wherein the common cycles have a common duration.

58. The method as in claim 57, wherein the common cycles for each of the channels are time offset relative to the respective common cycles for the other ones of the channels.

59. The method as in claim 57, wherein the mapping reoccurs for each of the common cycles on a periodically reoccurring basis.

60. The method as in claim 56, wherein each of the time frames for the input channel is comprised of at least one sub-time frame, the method further comprising:

mapping each of the input channel sub-time frames into at least one of the output channel time frames.

61. The method as in claim 56, wherein each of the time frames for the output channels and the input channels is comprised of at least one sub-time frame, the method further comprising:

mapping each of the input channel sub-time frames is mapped into one of the output channel sub-time frames.

62. The method as in claim 56, wherein each of the time frames provides a plurality of data units, the method further comprising:

mapping the time frames for the respective ones of the output channels from a respective subset of the input channels; and

receiving for each of the time frames of the output channels a subset of data units from the input channel.